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| 10/765,481 | 01/27/2004 | Paul Shirley | MICS:0117 (02-1051) | 9550 |

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| EXAMINER | |
|---|---|
| TOLEDO, FERNANDO L | |

| ART UNIT | PAPER NUMBER |
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| 2895 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/765,481 | SHIRLEY ET AL. | |
| | Examiner | Art Unit | |
| | Fernando L. Toledo | 2895 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *10 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-11 and 29-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11 and 29-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application.
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5, 6, 8 – 10 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Akram et al. (U. S. Patent 5,609,995 A).

3. In re claim 1, Akram discloses (a) soft baking a semiconductor wafer comprising a substrate having a plurality of features formed thereon at a first temperature for a first predetermined period of time, wherein the plurality of features is coated with a resist such that at least one unfilled void is present under the resist and between two of the plurality of features (columns 2 and 6, lines 5 – 8 and 29 – 35; respectively); and (b) after act (a), soft-baking the semiconductor wafer at a second higher temperature for a second predetermined period of time (column 6, lines 46 - 53).

4. In re claim 2, Akram discloses wherein no resist craters are formed (column 2, lines 40 - 45).

5. In re claim 5, Akram discloses wherein the semiconductor wafer is subjected to a temperature in the range of 30 – 90 °C during the first predetermined period of time (column 6, lines 30 – 35).

6. In re claim 6, Akram discloses wherein the first predetermined period of time is less than 90 seconds (column 6, lines 30 - 35).

7. In re claim 8, Akram discloses wherein the higher temperature is in the range of 90 – 150 °C (column 6, lines 50 – 55).

8. In re claim 9, Akram discloses wherein the higher temperature is in the range of 100 – 130 °C (column 6, lines 50 – 55).

9. In re claim 10, Akram discloses wherein the second predetermined period of time is less than 90 seconds (column 6, lines 50 – 55).

10. In re claim 30, Akram discloses (a) soft-baking a substrate having a plurality of features coated with a resist at a first temperature for a first predetermined period of time using a first thermal unit (column 6, lines 30 – 35); and after act (a) soft-baking the substrate at a second higher temperature for a second predetermined period of time using a second thermal unit (column 6, lines 45 – 55).

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 3, 4, 7, 11, 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram as applied to claims 1, 2, 5, 6, 8 – 10 and 30 above.

13. In re claim 3, Akram discloses that the resist hardens (column 6, line 29) but does not explicitly disclose air trapped in the at least one unfilled void under the resist does not possess sufficient energy to expand through the resist.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to conclude that, since the resist of Akram hardens as stated in column 6, line 29; during the first soft-bake, the air trapped under the resist does not posses sufficient energy to expand through the resist since similar materials are treated in a similar manner it should yield similar results.

14. In re claim 4, Akram does not explicitly disclose that the resist remains fluid; air trapped in the at least one unfilled void under the resist expands through the resist surface; and the resist flows back to its original conformal shape.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the resist of Akram remain fluid, since the second soft-bake of Akram removes the solvents as stated in column 6, lines 47 and 48 and hence during the first predetermined soft-bake the resist will still have solvents making it partially fluid and thus one of ordinary skill in the art would conclude that the air trapped under the resist would expand through the resist surface and the resist would flow back to its original conformal shape since similar materials that are treated in a similar manner should yield similar results.

15. In re claim 7, Akram does not disclose that the period of time is more than 90 seconds.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the time period be more than 90 seconds, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the

optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. Note that the specification contains no disclosure of either the critical nature of the claimed heating time or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen heating time or upon another variable recited in a claim, the Applicant must show that the chosen heating time is critical. *In re Woodruf,* 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). In addition, the selection of heating time, is obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

16. In re claim 11, Akram does not disclose wherein the second predetermined period of time is more than 90 seconds.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the time period be more than 90 seconds, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

Note that the specification contains no disclosure of either the critical nature of the claimed heating time or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen heating time or upon another variable recited in a claim, the Applicant must show that the chosen heating time is critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). In addition, the selection of heating time, is obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

17. In re claim 29, Akram does not explicitly disclose wherein subsequent to acts (a) and (b) the void remains present under the resist.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to conclude that an unfilled void would remain in between the plurality of features under the resist, since similar materials have been treated in a similar matter thus it should yield similar results.

18. In re claim 31, Akram discloses prior to acts (a) and (b), at least one unfilled void is present under the resist and between two of the plurality of features (column 2, lines 5 - 8). Akram does not explicitly disclose wherein subsequent to acts (a) and (b) the void remains present under the resist.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to conclude that an unfilled void would remain in between the plurality of features under the resist, since similar materials have been treated in a similar matter thus it should yield similar results.

***Response to Arguments***

19. Applicant's arguments with respect to claims 1 – 11 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Fri 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Richards can be reached on 571-272-1736. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Fernando L. Toledo/
Primary Examiner, Art Unit 2895

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28 January 2010